WHAT IS CLAIMED IS:

1. An apparatus for determining a failure in an automatic transmission in a vehicle while running, comprising:

a first detecting portion which detects an operating state of the automatic transmission;

an estimating portion which estimates the operating state when the automatic transmission is in a neutral state in which transmission of power is interrupted, based on torque input from a power source of the vehicle to the automatic transmission; and

a failure determining portion which determines, while distinguishing between, a first failure related to the neutral state of the automatic transmission and a second failure that is different from the first failure, based on the detected operating state and the estimated operating state.

2. The apparatus according to claim 1, wherein the second failure is a failure related to slipping of a frictional engaging element with which a gear speed of the automatic transmission is established.

3. The apparatus according to claim 2, wherein the failure determining portion determines, while distinguishing between, the first failure related to the neutral state and the second failure related to slipping of a frictional engaging element while the vehicle is running in a predetermined gear speed.

4. The apparatus according to claim 2, further comprising:

a second detecting portion which detects a speed of a power source of the vehicle,

wherein the failure determining portion determines, while distinguishing between, the first failure related to the neutral state and the second failure related to slipping of a frictional engaging element when the speed of the power source has fulfilled a preset condition.

5. The apparatus according to claim 1, wherein the operating state is an input speed of the automatic transmission.

6. The apparatus according to claim 5, wherein the failure determining portion determines that the first failure related to the automatic transmission being in the neutral state has occurred when a difference between the detected input speed and the estimated input speed falls below a preset value, and determines that the second failure related to slipping of a frictional engaging element with which a gear speed of the automatic transmission is established has occurred when the difference between the detected input speed and the estimated input speed exceeds the preset value.

7. The apparatus according to claim 6, wherein the automatic transmission includes a first control valve and a second control valve, both of which control hydraulic pressure; the first control valve controls an application pressure of the frictional engaging element with which a gear speed of the automatic transmission is established and the second control valve regulates the pressure of hydraulic fluid discharged from an oil pump; and the first failure related to the neutral state is a failure of the first control valve, and the second failure related to slipping of the frictional engaging element is a failure of the second control valve.

8. The apparatus according to claim 6, wherein the failure determining portion determines, while distinguishing between, the first failure related to the neutral state and the second failure related to slipping of a frictional engaging element while the vehicle is running in a predetermined gear speed.

9. The apparatus according to claim 6, further comprising:

a second detecting portion which detects a speed of a power source of the vehicle,

wherein the failure determining portion determines, while distinguishing between, the first failure related to the neutral state and the second failure related to slipping of a frictional engaging element when the speed of the power source has fulfilled a preset condition.

10. A method for determining a failure in an automatic transmission in a vehicle while running, comprising the steps of:

A. detecting an operating state of the automatic transmission;

B. estimating the operating state when the automatic transmission is in a neutral state in which transmission of power is interrupted, based on torque input from a power source of the vehicle to the automatic transmission;

C. determining whether a failure has occurred in the automatic transmission; and

D. when it has been determined that the failure has occurred, determining whether that failure is a first failure related to the neutral state of the automatic transmission or a second failure that is different from the first failure, based on the detected operating state and the estimated operating state.

11. The method according to claim 10, wherein the second failure is a failure related to slipping of a frictional engaging element with which a gear speed of the automatic transmission is established.

12. The method according to claim 11, wherein it is determined in step D whether the failure is the first failure related to the neutral state of the automatic transmission or the second failure related to slipping of a frictional engaging element while the vehicle is running in a predetermined gear speed.

13. The method according to claim 11, further comprising the step of:

E. detecting a speed of a power source of the vehicle,

wherein it is determined in step E whether the failure is the first failure related to the neutral state or the second failure related to slipping of a frictional engaging element when the speed of the power source has fulfilled a preset condition.

14. The method according to claim 10, wherein the operating state is an input speed of the automatic transmission.

15. The method according to claim 14, wherein it is determined in step D whether the failure is the first failure related to the neutral state or the second

failure related to slipping of a frictional engaging element while the vehicle is running in a predetermined gear speed.

16. The method according to claim 15, wherein the first failure related to the neutral state is a failure of a first control valve provided in the automatic transmission, which controls an application pressure of the frictional engaging element with which a gear speed of the automatic transmission is established, and the second failure related to slipping of the frictional engaging element is a failure of a second control valve provided in the automatic transmission, which regulates a pressure of hydraulic fluid discharged from an oil pump.

17. The method according to claim 15, wherein it is determined in step D whether the failure is the first failure related to the neutral state or the second failure related to slipping of a frictional engaging element while the vehicle is running in a predetermined gear speed.

18. The method according to claim 15, further comprising the step of:

E. detecting a speed of a power source of the vehicle,

wherein it is determined in step C that the failure has occurred in the automatic transmission when the speed of the power source has fulfilled a preset condition.